

IEEE Guide for the Application of Capacitance Current Switching for AC High-Voltage Circuit Breakers Above 1000 V

Amendment 1

IEEE Power and Energy Society

Developed by the
Switchgear Committee

IEEE Std C37.12a™-2020
(Amendment to IEEE Std C37.012-2014)

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Switchgear Committee
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Abstract: Covered in this amendment are changes in di/dt limitations for non-oil circuit breakers. A section has been added describing possible delayed current zeros when doing a rapid close—open of a line circuit breaker (CO) when shunt reactors are connected to a line or cable. Some minor errors have been corrected and references have been updated.

Keywords: capacitive current switching, circuit breaker capacitive inrush/outrush limitations, IEEE C37.012a, switching reactor compensated lines

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David Caverly
Michael Christian
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Raymond Frazier
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Michael Skidmore
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John Webb
Casey Weeks
Jan Weisker
Marcus Young
Wei Zhang
Jim Zhou

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Roy Alexander
Thomas Barnes
Anne Bosma
Demetrio Bucaneg Jr.
Arben Bufi
Ted Burse
Eldridge Byron
Paul Cardinal
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Sergio Flores
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Lou Grahor
John Hall
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Victor Hermosillo
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Todd Irwin
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Joseph Jasinski
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Yuri Khersonsky
James Kinney
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Omar Mazzoni
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Charles Morse
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Terry Woodyard
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Wei Zhang
Xi Zhu

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Introduction

This introduction is not part of IEEE Std C37.012a-2020, IEEE Guide for the Application of Capacitance Current Switching for AC High-Voltage Circuit Breakers Above 1000 V.

Recent work has demonstrated that for vacuum, SF₆ and other gas switchgear, the inrush current frequency on capacitor energization or restrike is much less important than the current magnitude and often does not need to be limited. Also, the inrush current magnitude alone may not need to be limited. The limiting parameter is the ICI (Inrush Current Integral) during the pre-arc time of a making operation, before galvanic contact of the contacts is achieved. As a result, the formerly used $i \times f$ product (or di/dt) as a limitation for switchgear is less of a concern. Therefore, IEEE Std C37.012 has been amended to provide guidance in applications where the formerly used $i \times f$ limitation is exceeded. At this time, it is deemed appropriate to retain the inrush current magnitude limits with less emphasis on the importance of the natural frequency of the inrush current until such time as the impact of the ICI is better understood and reducible to an easily computed form suitable for an application guide.

Also, a few other corrections have been addressed (i.e., Ferranti rise numbers, added clauses on reactor compensated lines and cables, delayed current zero possibility, and the discharge capability of capacitor units with no internal fuses, etc.). References have been updated, and IEEE Std C37.100.2 was added to the normative references.

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2. Normative references

Change the following references in Clause 2:

IEEE Std C37.04™, IEEE Standard ~~Rating Structure for AC High Voltage Circuit Breakers~~ for Ratings and Requirements for AC High-Voltage Circuit Breakers with Rated Maximum Voltage Above 1000 V.^{2,3}

IEEE Std C37.09a™~~—2005~~, IEEE Standard Test Procedures for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis—Amendment 1: Capacitance Current Switching with Rated Maximum Voltage Above 1000 V.

IEEE Std C37.010™, IEEE Application Guide for AC High-Voltage Circuit Breakers > 1000 Vac Rated on a Symmetrical Current Basis.

Delete the following references in Clause 2:

IEEE Std C37.04a™-2003, IEEE Standard Rating Structure for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis Amendment 1: Capacitance Current Switching.